

A. OVERVIEW OF KEY ISSUES RAISED IN THE FOUNDING PAPERS

Issues raised in the founding affidavit and supporting affidavits

- **Shell must obtain an environmental authorisation in terms of NEMA in order to commence seismic testing:** Shell has an exploration right in terms of the MPRDA together with an approved environmental management programme in terms of that same Act. Shell does *not* have an environmental authorisation in terms of NEMA. Both the MPRDA and NEMA make it an offence for Shell to commence its activities without an environmental authorization.
- **The EMPr contains no discussion of cultural, spiritual, or heritage issues relating to the sea:** The sea and its sand are known to have healing properties among different communities living along the Wild Coast. Traditional healers rely on the sea for their treatments, and accessing the sea forms part of their training. Traditional healers also go to the sea to commune with ancestors, who summon them to give advice. Some of the ancestors reside in the sea because they loved the sea whilst they lived, while others reside in the sea because they died in the sea, and just as it is important not to relocate ancestors on land, it is just as important not to disturb these ancestors through ocean pollution or other disturbances.
- **Affected communities were not properly consulted in preparing the 2013 EMPr or the 2020 audit:** Shell only reached out to three kings, which excluded the Kingship of Eastern Mpondoland, which is the kingship with jurisdiction over the Amadiba community. Not only did they fail to consult all relevant traditional leaders, but Shell also cannot assume that these kings represent the people. The communities that will be impacted were not consulted. Further, Shell's consultation with the Kings was flawed in that Shell's consultants did not respect the Kings' assertion that their "support is conditional to ongoing consultation and open communication between all the role players in this project in the future." No such ongoing consultation was carried out.
- **The EMPr is outdated and contains significant information gaps:** The EMPr is outdated with respect to assessing the impact of seismic testing on numerous marine species. For example, while the EMPr relies on research suggesting that plankton outside of a 10m radius would not be adversely impacted, more recent scholarship found that plankton over 1km away could be impacted by seismic tests. While the EMPr notes that giant squid strandings due to severe internal injuries have occurred following seismic surveys and that there is little published information on the impact of seismic testing on invertebrates, the EMPr improperly claims that the potential impacts are negligible. Similarly, the impact of seismic testing on fish and cetaceans was inadequately studied and assessed. As NEMA demands and Drs. Elwen and Gridley make clear in their expert report, ignorance of impact is not the same as absence of impact and the precautionary principle *must be applied*.

Issues raised in the expert report from Drs. Simon Elwen and Tess Gridley

- **Ignorance of impact is not the same as no impact, and the precautionary principle must be invoked:** There are significant knowledge gaps regarding the impact of seismic surveys on marine life. For example, there is currently not enough information

about the species of fishes in the area or their responses to sound which is necessary to be able to make any meaningful assessment of the impacts. Therefore, the precautionary approach set out in NEMA suggests that this lack of knowledge should weigh *against* the survey, not in favour of it. Though significant knowledge gaps remain, numerous studies have been published since the EMPr was written in 2013.

- **New Marine Protected Areas (MPAs) have been established since the 2013 EMPr:** New Marine Protected Areas (MPAs) have been established in South Africa and other marine spatial planning recognizing the biological importance and uniqueness of the area. This includes the Protea Banks MPA, which was established in 2019 within ~20km of the northern boundary of the survey area, and almost the entire coastline between Algoa Bay in the south and Aliwal Shoal in the north (~30km south of Durban) which is recognized as being an “Ecologically or Biologically Significant Area” (EBSA)—termed the Protea Banks and Sardine Route EBSA. This new context requires a thorough assessment to adequately consider the potential impacts from the seismic survey.
- **Key species have decreased in population health or conservation status since the 2013 EMPr:** Since the EMPr was completed, two species of large whale and one species of coastal dolphin in the area have decreased in population health or conservation status since the 2013 EMPr. In particular, the ‘inshore’ population of Bryde’s whale, which are resident to the Agulhas Bank area, have been defined as a unique subspecies numbering fewer than 600 globally. These are the most threatened whale species in South Africa. Endangered humpback dolphins, which number fewer than 500 in South Africa. Endangered humpback dolphins are common in Algoa Bay and East London, and their extreme vulnerability is not recognized in the EMPr. Further, all marine turtle species which occur within South Africa are now listed on the IUCN Red List varying between Vulnerable and Critically Endangered
- **Important diversity of fish species in the Amathole region:** An underwater video survey of reefs off the Amathole region up to 200m depth revealed the presence of high fish diversity and a high number of endangered and critically endangered fish species, including several specimens poorly known to science and some potentially new species that are not yet known to scientists.
- **Importance of sound to seabirds:** There is growing recognition of the importance of sound to seabirds, especially penguins and gannets, for hunting and social activities, and noise from seismic surveys may affect foraging efficiency and ultimately survival. African penguins, cormorants, and gannets are already endangered or critically endangered, so even small reductions in foraging efficiency could have significant population consequences for these species.
- **Acoustic disturbance in the ocean can have individual, population, and ecosystem-level effects:** Acoustic disturbance in the ocean can have effects at multiple levels, from the individual (e.g. tissue damage, behavioural avoidance, increased stress hormones, effects on reproduction) to the greater population (e.g. reduced fertility or survivorship in an affected cohort or group of animals), and even ecosystem-level effects if multiple species are affected. Any effects of human disturbance are compounded by, and act ‘on top of’ many other natural impacts and variations in the wild, such as food availability and oceanographic conditions.
- **Cumulative stresses to cetaceans must be considered:** No studies have directly linked seismic surveys to either stranding or death of cetaceans, but multiple studies have

shown behavioral responses of cetaceans to seismic surveys including movement away, changes in movement/dive parameters and changes in vocalization/singing behavior, and the reductions in the ability over which other animals can be heard (important factors for breeding). These stresses are cumulative on top of existing stresses on these populations, such as food shortages, changes in predator pressures, etc. Noise pollution is already increasing in the marine environment from manmade activities such as shipping, so the noise from the seismic testing is in addition to these preexisting sources of noise.

- **Seismic testing cannot be distinguished from the ultimate goal of oil extraction:** The goal of surveying for oil is to ultimately extract it. The risks of future exploration (drilling), extraction and processing are also many, long-term and potentially catastrophic (oil spills). These longer-term must be considered in the granting of permits to conduct seismic surveys. The survey and any future extraction of hydrocarbons will impact a high number of endangered and/or endemic marine mammal, turtle, bird and fish species, as well as completely unstudied marine ecosystems. The immediate and cumulative impacts of seismic surveys, noise and hydrocarbon extraction in this environment remain unknown and a precautionary approach must be used.

Issues raised in Dr. Jacqueline Sunde's Supporting Affidavit on Dwesa-Cwebe

- **The ocean is a fundamental component of ecological knowledge, customary law, and natural resources governance:** Dwesa-Cwebe residents' relationship with the ocean and their ancestors has shaped the development of their local ecological knowledge, their customary law, and within this, the source of their rights to use natural resources.
- **The sea is home to ancestors who must not be disturbed:** In the dominant myth of Creation among Dwesa-Cwebe residents, the sea is "our big home" and the ocean water possesses divine power to cleanse and heal. Most Dwesa-Cwebe residents believe that there are ancestral spirits in the ocean, and thus the ocean is sacred—with its significance increasing with depth. Further, disturbing these ancestors will cause them great distress.
- **Certain uses of the sea constitute mandatory cultural practices:** Residents regard fishing and harvesting in the sea as *isithethe* (custom). However, there are certain uses of the sea and marine resources that are considered *isiko* (obligatory rituals that are a part of their customary law). In other words, practicing their culture *requires* the sea.
- **The sea has healing powers and sangomas rely on the sea to carry out their work:** The sea is also believed to hold healing powers and is an important source of medicine. Sangomas use sea water for healing, and the sangomas of the region are recognised as having specific powers and connections with the ancestors in the sea. These sangomas play the role of linking people on the land with ancestors within the sea, and there are specific rituals to facilitate this. Further, ordinary residents also participate in rituals involving the sea when instructed to do so by sangomas, and these rituals are considered to be obligatory in terms of the authority of the ancestors.
- **South African Courts have recognised that the Dwesa-Cwebe community have evolved a system of living customary law that governs their use of natural resources:** In 2018, the Supreme Court of Appeal confirmed that the Dwesa-Cwebe communities

had customary fishing rights arising from their customary systems of law, that was in turn protected by sections 30 and 31 of the Constitution.

- **Socio-economic significance of access to the marine resources:** The coastline provides basic food security and a source of protein to the majority of the residents living in the localities adjacent to the sea. There are 61 small-scale fishing cooperatives that are rightsholders in the Exploration Area that will be impacted by the seismic testing.
- **Exclusion of Dwesa-Cwebe small-scale fishers from the public participation process:** The EMPr public participation process failed to include small-scale fishers. The BID document was not available in their home language and was not available in an accessible form. Most of these fishers live in poor, rural villages and are not able to access the mainstream media targeted by the consultants for the public participation purpose.

B. OVERVIEW OF KEY ISSUES ADDRESSED BY EXPERTS IN THE SUPPLEMENTARY PAPERS

Seismic testing may cause significant harm to numerous marine species, including critically endangered species

- **Significant harm to animals is the most likely scenario:** Drs. Jean Harris, Jennifer Olbers, and Kendyl Wright—all leading experts on marine science—concluded “that significant direct harm to individual animals and harm to populations of endangered species is the most likely scenario” to result from this seismic testing.
- **Impact on zooplankton and subsequent impact on the food chain:** A 2017 study found that a single airgun blast kills over 50% of zooplankton within a 1-kilometre radius. This study directly contradicts the 2013 EMPr’s outdated claim that only plankton in a 10-metre radius would be affected. The full impacts of the seismic surveying on plankton cannot be monitored or mitigated by onboard observers. Plankton are the building blocks of marine ecosystems—they form the base of numerous marine food webs, with impacts on fish and cetaceans. However, both the 2013 EMPr and the audit fail to address the likely harm to plankton and the corresponding adverse impact on the broader ocean ecosystem.
- **Physiological impact of the noise on marine animals:** Based on peer-review scientific literature, it is clear that physical damage to marine animals, including soft tissue trauma damage, embolisms, damage to organs used in balance and orientation, concussions, haemorrhaging, decompression sickness and both temporary and permanent threshold shifts to hearing ability, have been directly linked to the kind and level of sound emitted during this nature of seismic surveys.
- **Behavioural impact on marine mammals:** Seismic surveys can interfere with whale communication and induce chronic stress, which can have species-level consequences. This is particularly concerning in light of the number of endangered whale populations on the Transkei coast. The testing will also affect other marine mammals by inducing a stress response, by disrupting essential behaviours such as vocalizing, mating, or foraging, and by masking acoustic communication, including communication between mothers and calves.

- **Adverse impact of seismic testing on endangered African penguins:** Scientists found that the endangered African penguin avoided preferred feeding sites when a seismic survey was active nearby, which is particularly concerning as these penguins are already stressed by prey depletion and facing potential extinction.
- **Heightened harm to whales and turtles likely during the particular proposed testing period:** February and March are peak times when the hatchlings of critically endangered leatherback and endangered loggerhead turtles are carried from the iSimangaliso MPA nesting grounds through the testing area by the Agulhas current. Seismic testing during these times is likely to lead to mortalities. In December, threatened humpback whale mothers and calves are particularly vulnerable.
- **Significant portions of South Africa’s endangered linefish will be affected:** 13% of South Africa’s linefish species are threatened with extinction and most are found along the East Coast. Several of these linefish species, which are classified as endangered or critically endangered, have not yet recovered since the linefish “State of Emergency” declared in 2000.
- **Adverse impacts on the coelacanth, South Africa’s “living fossil”, is likely:** Coelacanth, listed as critically endangered under South African law, is considered a “living fossil”—a unique window into the past—as it belongs to an ancient group of fishes whose fossil record stretches back over 400 million years. There is a high risk to the Coelacanth population if even a small number are adversely impacted by the seismic survey.

Likely negative impact on the fishing industry

- **Namibia provides a case study of the adverse impact of Shell’s seismic testing on the fishing industry:** There was a sudden drop in catches that devastated the albacore tuna industry after Shell commenced seismic surveys in Namibia in 2012. Although it is hard to provide direct evidence that tuna migration and catch losses were caused by the seismic surveys (research of this magnitude is very expensive), the circumstantial evidence points toward Shell’s seismic testing as the cause.
- **Small-scale fishers could be significantly impacted:** Shell should communicate with small-scale fishers “whose meagre livelihood could be significantly negatively impacted if the fish run away due to seismic survey noise.”

Proposed mitigation measures are woefully inadequate

- **Absence of acoustic modelling means proposed mitigation measures could be misguided or ineffective:** An assessment of the impact of seismic surveying that does not use current science and does not contain acoustic modelling cannot accurately assess the harms that this seismic surveying will cause, which means that the proposed mitigation measures could be inutile and misdirected. As Douglas Nowacek stated in his expert report, “without any modelling, it is simply not possible to conclude that mitigation measures are effective at either reducing or eliminating harm.”
- **No mitigation measures at night:** All proposed mitigation measures can only be performed during the day, meaning that from sunset to sunrise, around half the time the testing operations are taking place, there are no mitigation measures in place.
- **Mitigation measures will not protect deep-diving beaked whales or turtle hatchlings:** Mitigation measures, such as time-area closures, visual observers, and passive

acoustic monitoring and “soft starts” or “ramp ups” are inadequate to protect deep-diving beaked whales or other marine mammals present all year-round.

- **No mitigation measures for zooplankton:** Onboard observers are not able to observe the effects of the seismic testing on zooplankton, nor can they avoid zooplankton, so there are no mitigation measures in place to protect them.
- **Soft-starts are ineffective and rely on a faulty assumption that animals will flee from the sound:** The primary mitigation measures for seismic surveys in South Africa include soft-starts, which relies on the assumption that animals will move away from the sound source before the full-power airgun blasts begin, thus attempting to minimise the negative effects of the airgun blasting activity. However, various studies contest this assumption and have revealed a growing concern for animals that are unable to avoid or out-swim the airgun arrays.
- **Marine Mammal Observers (MMOs) are an insufficient safeguard:** It is not uncommon for MMOs to be subject to coercion, harassment, and intimidation. Further, the EMPr recommends that the decision to terminate firing be made by the operator—not the MMO—due to the cost associated with terminating activities.

The 2013 EMPr and 2020 audit are flawed

- **The 2020 auditors lacked independence:** The 2020 audit of the 2013 EMPr was completed by the same company that wrote the 2013 EMPr, and therefore the audit was not independent.
- **The 2013 EMPr and 2020 audit preparers lacked expertise:** The authors of both the 2013 EMPr and the 2020 audit are inadequately qualified, as they appear to lack any professional marine science or marine environmental training.
- **Research on the effects of seismic testing on marine ecosystems and species has progressed significantly since 2013, yet the 2020 audit did not incorporate this post-2013 research:** The EMPr for this proposed testing was completed in 2013, but experts know far more about the impact of seismic noise in the ocean environment now more than they did back in 2013. The 2020 audit does not consider the mounting scientific studies and government reviews that expose the full impacts of seismic surveys on marine organisms and ecosystems—many of which were written after the 2013 EMPr. While the 2013 EMPr suggests that the impact of seismic testing on marine animals would be low, recent studies on marine animals such as zooplankton, endangered African penguins, and beaked whales contradict these findings and the proposed mitigation measures will be ineffective. The consultants who are supporting such an old EMPr are deviating from industry best practice.

Key Takeaways from the Individual Expert Reports

1. Douglas Nowacek

Repass-Rodgers Chair of Marine Conservation Technology

- The sounds that seismic arrays produce are among the loudest that humans regularly introduce into the ocean, exceeded only by the occasional use of explosives.
- The sound that these marine animals are exposed to is not only the loud individual pulses that the air guns emit every 10 to 15 seconds—but also the accompanying increase of background noise caused by continuous reverberating energy in the periods between pulses. Further, this acoustic energy from airguns can propagate hundreds to thousands of kilometres in marine environments.
- Thus, marine animals exposed to noise from seismic airguns must contend with both loud individual pulses every 10 to 15 seconds and with continuous reverberating energy in the periods between the pulses.
- Mitigation measures, such as time-area closures, visual observers, and passive acoustic monitoring and “soft starts” or “ramp ups” are inadequate to protect deep-diving beaked whales or other marine mammals present year-round.
- According to a 2021 literature review of 538 scientific papers on the effects of human-caused alterations to ocean soundscapes on marine animals, 74.4% of the studies found significant negative impacts to marine animals.
- A 2017 study found that a single airgun blast kills over 50% of zooplankton within a 1-kilometre radius.
- The EMPr for this proposed testing was completed in 2013, but experts know far more about the impact of seismic noise in the ocean environment now than they did back in 2013.
- There was no acoustic modelling undertaken and without this modelling, the EMPr could not have accurately assessed the harms the seismic survey will cause.
- Because the impacts found in the EMPr are based on outdated science and with no acoustic modelling, the proposed mitigation measures based on those impacts may be ineffective at reducing or eliminating harm to marine animals.
- While the 2013 EMPr suggests that the impact of seismic testing on marine animals would be negligible to medium, recent studies on marine animals such as zooplankton, and beaked whales contradict these findings.

2. Jean Mary Harris

Executive Director of WILDOCEANS

Jennifer Olbers

Senior Marine Scientist at WILDOCEANS

Kendyl Andrea Wright

Marine Protected Area Scientist at WILDOCEANS

- Drs. Jean Harris, Jennifer Olbers, and Kendyl Wright—all leading experts on marine science— have concluded “that significant direct harm to individual animals and harm to populations of endangered species is the most likely scenario” results from this seismic testing.
- Turtle hatchlings will be affected by the seismic survey and *none* of the mitigation measures will address this.

- Zooplankton can be impacted by seismic surveys at a range of over 1km while the EMPr, based on outdated research, claims this area is only 10m.
- February and March are peak times when the hatchlings of critically endangered leatherback and endangered loggerhead turtles are carried from the iSimangaliso MPA nesting grounds through the testing area by the Agulhas current. Seismic testing during these times is likely to lead to mortalities.
- In December, threatened humpback whale mothers and calves are particularly vulnerable.
- Recent literature provides credible concern regarding ecosystem and food-chain impacts of seismic surveys. In particular, recent research has shown significant mortality in zooplankton up to 1.2km from the survey array. Zooplankton forms the base of many important marine food webs, and therefore depletion of zooplankton could have an impact on food for their predators, such as fish, as well as on fish eggs and larvae (Ichthyoplankton) with potential impacts on species that are important in local fisheries. Because further study on these impacts has yet to be carried out in the South African context, it is not possible to know the severity or localisation of these adverse impacts. Finally, plankton has been implicated in links to climate change via their role in iron fertilisation and carbon sequestration through whales foraging on krill and subsequent defecation.
- Based on peer-review scientific literature, it is clear that physical damage to marine animals, including soft tissue trauma damage, embolisms, damage to organs used in balance and orientation, concussions, haemorrhaging, decompression sickness and both temporary and permanent threshold shifts to hearing ability, have been directly linked to the kind and level of sound emitted during this nature of seismic surveys.
- Scientists found that the endangered African penguin avoided preferred feeding sites when a seismic survey was active nearby, which is particularly concerning as these penguins are already stressed by prey depletion.
- Having carefully considered the available information in this regard it is our opinion that seismic surveys do cause harm to both species and the ecology, and that significant direct harm to individual animals and harm to populations of endangered species is the most likely scenario in the case of the seismic survey underway off the east coast of South Africa. Of specific concern is the impact on threatened humpback whales (at a particularly vulnerable stage for mothers and calves) in December, the impact (likely mortalities) on critically endangered (leatherback) and endangered (loggerhead) turtles (according to South African TOPS legislation) in February and March which are peak times when hatchlings are carried through the area from the iSimangaliso MPA nesting grounds.

3. Michael Noel Bruton

Director of Mike Bruton Imagineering, retired Professor of Ichthyology

- The coelacanth is listed as critically endangered under South African law.
- Coelacanth is considered a “living fossil”—a unique window into the past—as it belongs to an ancient group of fishes whose fossil record stretches back over 400 million years.
- The wreckfish, *Polyprion americanus*, does occur off the Wild Coast and coelacanth is likely to occur there as well (as specimens have been caught or seen on either side of the Wild Coast).

- There is a high risk to the Coelacanth population if even a small number are adversely impacted by the seismic survey.

4. Lynton Francois Burger

Founding Managing Director of Environmental Resources Management Southern Africa, which prepared the 2013 EMPr

- The authors of both the 2013 EMPr and the audit are inadequately qualified, as they appear to lack any professional marine science or marine environmental training.
- The authors of the 2020 audit lack independence, as they themselves prepared the 2013 EMPr.
- The 2013 EMPr and the proposed mitigation measures therein are out of date, and consultants who are standing by such an old EMPr are not following industry best practice.
- The EMPr does not consider the mounting scientific studies and government reviews that expose the full impacts of seismic surveys on marine organisms and ecosystems—many of which were written after the 2013 EMPr.
- The full impacts of the seismic surveying on plankton, which are the building blocks of ocean ecosystems, cannot be monitored or mitigated by onboard observers. Both the EMPr and the audit fail to address this.

5. David Russell

Fisheries consultant based in Namibia

- There was a sudden drop in catches that devastated the albacore tuna industry after Shell commenced seismic surveys in Namibia in 2012. Although it is hard to provide direct evidence that tuna migration and catch losses were caused by the seismic surveys (research of this magnitude is very expensive), the circumstantial evidence points toward Shell’s seismic testing as the cause.
- Shell should communicate positively with small-scale fishers “whose meagre livelihood could be significantly negatively impacted if the fish leave the area due to seismic survey noise.”

6. Alexander Claus Winkler

Inshore fisheries expert with expertise in fish behaviour and life-history assessment

- In-depth studies on the effects of seismic surveys on fish in the wild have been published since 2013 and have found reduced foraging behaviours among such fish, which may result in them having less energy to reproduce, grow, or migrate. It is likely that the proposed seismic survey will cause similar changes to the foraging behaviour of the fish in the survey area.
- Transkei and Algoa Bay are thought to be population strongholds for several fish species that are under threat of extinction.
- Given the slow and lethargic nature of Coelacanths, there is no doubt that if they do inhabit the deep reefs of the Transkei, they will be directly or indirectly affected by the seismic survey.
- 13% of South Africa’s linefish fish species are threatened with extinction and most are found along the East Coast. Several of these linefish species, which are classified as endangered or critically endangered, have not yet recovered since the linefish “State of Emergency” declared in 2000.